

IN THE CLAIMS

Please amend the claims as follows:

1. (Currently Amended) A sensor head, comprising:

a three-dimensional base body having a curved surface allowing definition of a circular orbital band;

an interdigital electroacoustic transducer being connected to an active a timing-controlled switching unit disposed outside of the sensor head, and arranged on the orbital band of the three-dimensional base body, and configured to excite a surface acoustic wave to perform multiple roundtrips along the orbital band; and

a gas-sensitive film at least a part of which is formed on at least a part of the orbital band of the three-dimensional base body, and configured to react with a specific gas molecule so as to develop a change in a propagation characteristic of the surface acoustic wave,

wherein the active timing-controlled switching unit is actively controlled such that the active switching unit is configured to switch respective signal paths at desired switching timings between an external high frequency generator and an external detection/output unit so that the active timing-controlled switching unit is configured to transfer a high frequency electric signal from the external high frequency generator to the interdigital transducer, and [[then]] the active timing-controlled switching unit is configured to switch [[a]] the signal path from the interdigital transducer to the external detection/output unit, at a timing after the interdigital transducer has transmitted the surface acoustic wave, but just before the surface acoustic wave returns from a predetermined number of a plurality of roundtrips, and the interdigital transducer is configured to convert the surface acoustic wave orbiting along the orbital band into a high frequency output electric signal,

wherein the sensor head is configured actively controlled to output the high frequency output signal, from which a delay time of the surface acoustic wave after the predetermined

number of the plurality of roundtrips is calculated by the external detection/output unit, the delay time being generated by so as to detect the change in the propagation characteristic.

2. (Original) The sensor head of claim 1, wherein the orbital band is defined on the surface of the outer periphery of the three-dimensional base body.

3. (Original) The sensor head of claim 1, wherein the orbital band is defined on the interior face of a cavity of the three-dimensional base body.

4. (Previously Presented) The sensor head of claim 1, wherein the thickness of the gas-sensitive film is 100 nanometers or less.

5. (Previously Presented) The sensor head of claim 1, wherein the thickness of the gas-sensitive film is one five hundredth of the wavelength of the surface acoustic wave or less.

6. (Previously Presented) The sensor head of claim 1, wherein the thickness of the gas-sensitive film is one thousandth of the wavelength of the surface acoustic wave or less.

7. (Previously Presented) The sensor head of claim 1, wherein the gas-sensitive film is a film containing palladium.

8. (Original) The sensor head of claim 1 further comprising a temperature sensor on the surface of the three-dimensional base body configured to measure the surface temperature.

9. (Original) The sensor head of claim 8, wherein the temperature sensor includes a resistance-detection pattern provided on at least a part of the orbital band.

10. (Withdrawn) A gas sensor, comprising:

a three-dimensional base body having a curved surface allowing definition of a circular orbital band;

an interdigital electroacoustic transducer being connected to a timing-controlled switching unit disposed outside of the sensor head, and arranged on the orbital band of the three-dimensional base body, and configured to excite a surface acoustic wave to perform multiple roundtrips along the orbital band and generate a high frequency electric signal from the surface acoustic wave having experienced the multiple roundtrips;

a gas-sensitive film at least a part of which is formed on at least a part of the orbital band of the three-dimensional base body and configured to react with a specific gas molecule so as to develop a change in a propagation characteristic of the surface acoustic wave, wherein the interdigital transducer converts the surface acoustic wave orbiting along the orbital band into a high frequency electric signal so as to detect the change in the propagation characteristic;

a high frequency generator configured to feed a high frequency electric signal to the electroacoustic transducer; and

a detection/output unit configured to measure the high frequency electric signal pertaining to propagation characteristics of the surface acoustic wave from the electroacoustic transducer,

wherein the timing-controlled switching unit is configured to switch between the high frequency generator and the detection/output unit so that the timing-controlled switching unit

is configured to transfer a high frequency electric signal from the high frequency generator to the interdigital transducer, and then the timing-controlled switching unit is configured to switch a signal path from the interdigital transducer to the detection/output unit, after the interdigital transducer has transmitted the surface acoustic wave, but just before the surface acoustic wave returns from a predetermined number of a plurality of roundtrips.

11. (Withdrawn) The gas sensor of claim 10, wherein the high frequency generator and the detection/ output unit are integrated onto the three-dimensional base body.

12. (Withdrawn) The gas sensor of claim 10 further comprising a temperature sensor on the surface of the three-dimensional base body configured to measure the surface temperature.

13. (Withdrawn) The gas sensor of claim 12, wherein the temperature sensor includes a resistance-detection pattern delineated on at least a part of the orbital band.

14. (Withdrawn) A sensor unit, comprising:  
a three-dimensional base body having a curved surface allowing definition of a circular orbital band;  
an interdigital electroacoustic transducer being connected to a timing-controlled switching unit disposed outside of the sensor head, and arranged on the orbital band of the three-dimensional substrate and configured to excite a surface acoustic wave to perform multiple roundtrips along the orbital band and generate a high frequency electric signal from the surface acoustic wave being experienced the multiple roundtrips;

a gas-sensitive film at least a part of which is formed on at least a part of the orbital band of the three-dimensional base body and configured to react with a specific gas molecule so as to develop a change in a propagation characteristic of the surface acoustic wave, wherein the interdigital transducer converts the surface acoustic wave orbiting along the orbital band into a high frequency electric signal so as to detect the change in the propagation characteristic;

a packaging board on which the three-dimensional base body is mounted;  
a high frequency generator arranged on the packaging board and to feed a high frequency electric signal to the electroacoustic transducer;  
a detection/output unit arranged on the packaging board and measure the high frequency electric signal pertaining to the propagation characteristics of the surface acoustic wave from the electroacoustic transducer;

a first board wiring arranged on the surface of the packaging board and be electrically connected to the high frequency generator;

a second board wiring arranged on the surface of the packaging board and be electrically connected to the detection/ output unit; and

conductive connectors configured to electrically connect the first and the second board wiring to the electroacoustic transducer, respectively,

wherein the timing-controlled switching unit is configured to switch between the high frequency generator and the detection/output unit so that the timing-controlled switching unit is configured to transfer a high frequency electric signal from the high frequency generator to the interdigital transducer, and then the switching unit is configured to switch a signal path from the interdigital transducer to the detection/output unit, after the interdigital transducer has transmitted the surface acoustic wave, but just before the surface acoustic wave returns from a predetermined number of a plurality of roundtrips.

15. (Withdrawn) The sensor unit of claim 14 further comprising a temperature sensor on the surface of the three-dimensional base body configured to measure the surface temperature.

16. (Withdrawn) The sensor unit of claim 15, wherein the temperature sensor includes a resistance-detection pattern delineated on at least a part of the orbital band.

17. (Withdrawn) A sensor unit, comprising:

a three-dimensional base body having a curved surface allowing definition of a circular orbital band;

an interdigital electroacoustic transducer being connected to a timing-controlled switching unit disposed outside of the sensor head, and arranged on the orbital band of the three-dimensional substrate and configured to excite a surface acoustic wave to perform multiple roundtrips along the orbital band and generate a high frequency electric signal from the surface acoustic wave being experienced the multiple roundtrips;

a gas-sensitive film at least a part of which is formed on at least a part of the orbital band of the three-dimensional base body and configured to react with a specific gas molecule so as to develop a change in a propagation characteristic of the surface acoustic wave, wherein the interdigital transducer converts the surface acoustic wave orbiting along the orbital band into a high frequency electric signal so as to detect the change in the propagation characteristic;

a high frequency generator configured to be integrated on the three-dimensional base body and to feed a high frequency electric signal to the electroacoustic transducer;

a detection/output unit integrated on the three-dimensional base body and configured to measure the high frequency electric signal pertaining to the propagation characteristics of the surface acoustic wave from the electroacoustic transducer;

a packaging board on which the three-dimensional base body is mounted;

a board wiring arranged on the surface of the packaging board; and

a conductive connector configured to electrically connect the first interconnect to the detection/ output unit,

wherein the timing-controlled switching unit is configured to switch between the high frequency generator and the detection/output unit so that the timing-controlled switching unit is configured to transfer a high frequency electric signal from the high frequency generator to the interdigital transducer, and then the timing-controlled switching unit is configured to switch a signal path from the interdigital transducer to the detection/output unit, after the interdigital transducer has transmitted the surface acoustic wave, but just before the surface acoustic wave returns from a predetermined number of a plurality of roundtrips.

18. (Withdrawn) The sensor unit of claim 17 further comprising a temperature sensor on the surface of the three-dimensional base body configured to measure the surface temperature.

19. (Withdrawn) The sensor unit of claim 18, wherein the temperature sensor includes a resistance-detection pattern delineated on at least a part of the orbital band.

20. (Previously Presented) The sensor head of claim 1, wherein the high frequency electric signal converted by the interdigital transducer is used to determine the reaction with the specific gas molecule through the change in the propagation characteristic.

21. (Previously Presented) The sensor head of claim 1, wherein an existence of the specific gas molecule or a density of the specific gas molecule is measured by the delay time.

22. (Previously Presented) The sensor head of claim 1, wherein the three-dimensional base body is made of piezoelectric crystal.

23. (Previously Presented) The sensor head of claim 22, wherein the electroacoustic transducer is provided in an opening of the gas-sensitive film.

24. (Previously Presented) The sensor head of claim 22, wherein the electroacoustic transducer is separated from the gas-sensitive film.

25. (Previously Presented) The sensor head of claim 1, further comprising a piezoelectric film formed on the surface of the three-dimensional base body, wherein the electroacoustic transducer is provided on the piezoelectric film.

26. (Previously Presented) The sensor head of claim 25, wherein the gas-sensitive film is provided both on the surface of the three-dimensional base body and the piezoelectric film.

27. (Currently Amended) A sensor head, comprising:  
a three-dimensional base body having a curved surface allowing definition of a circular orbital band;

a first an exciting electroacoustic transducer arranged on the orbital band of the three-dimensional base body, and configured to excite a surface acoustic wave to perform multiple roundtrips along the orbital band;

a gas-sensitive film at least a part of which is formed on at least a part of the orbital band of the three-dimensional base body, and configured to react with a specific gas molecule so as to develop a change in the propagation characteristic of the surface acoustic wave; and

a second receiving interdigital transducer arranged on the orbital band of the three-dimensional base body separated from the [[first]] exciting electroacoustic transducer and isolated from an operation of the exciting electroacoustic transducer, and configured to receive and convert the surface acoustic wave orbiting along the orbital band into a high frequency output signal,

wherein the sensor head is configured to output the high frequency output signal, from which a delay time of the surface acoustic wave after the predetermined number of the plurality of roundtrips along the orbital band is calculated by an external detection/output unit, the delay time being generated by the change in the propagation characteristic, by detecting a transmitted surface acoustic wave through the second receiving interdigital transducer, the transmitted surface acoustic wave being excited by the exciting electroacoustic transducer.